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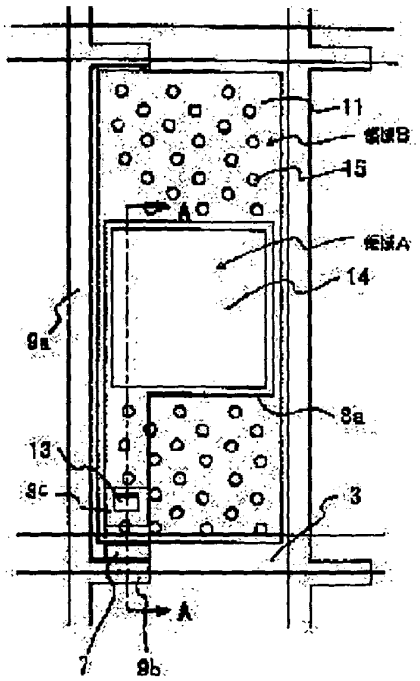
(54) LIQUID CRYSTAL DISPLAY PANEL AND MANUFACTURE THEREOF

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a liquid crystal display panel having a common substrate for both transmission type display and reflection type display wherein a liquid crystal panel is improved in the availability of ambient light and illumination light (backlight) better than conventional liquid crystal panels, stabilized in its display quality, and also simplified in its manufacture.

SOLUTION: Plural gate wirings 3 and plural source wirings 9a are arranged so as to be perpendicular to each other on an insulating substrate 1, and TFTs 7 are provided in the neighborhood of intersection parts of the both wirings. A reflection electrode 11 and a transmission electrode 8a are connected with a drain electrode 9c of the TFT 7 as a picture element electrode. A portion in which these picture element electrodes are formed consists of two regions of a high optical transmission efficiency region A and a high optical reflection efficiency region B if the portion is observed from above the substrate.



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CLAIMS

[Claim(s)]
[Claim 1] It consists of two or more pixels surrounded by two or more source wiring arranged so that it may intersect perpendicularly with two or more gate wiring and this gate wiring on a substrate. In the liquid crystal display panel by which the switching element formed near the intersection of the aforementioned gate wiring and the aforementioned source wiring and the pixel electrode connected to this switching element are formed in this pixel, and a penetrated type display and a reflected type display are performed simultaneously The aforementioned pixel electrode is a liquid crystal display panel characterized by having the first high conductive layer of the light-transmission efficiency connected electrically mutually, and the second high conductive layer of light reflex efficiency in the same pixel field.
[Claim 2] The liquid crystal display panel according to claim 1 by which the first conductive layer of the above and the second conductive layer are characterized by being mutually prepared in another layer through an insulating layer.
[Claim 3] The liquid crystal display panel according to claim 1 or 2 by which the first conductive layer of the above and the second conductive layer are characterized by connecting through the third conductive layer.
[Claim 4] The liquid crystal display panel of any of the claims 1-3 by which the first conductive layer of the above, the second conductive layer, or the third conductive layer is characterized [a bird clapper and] from the same material as a part of material which constitutes the aforementioned gate wiring or source wiring, or a publication.
[Claim 5] It is the liquid crystal display panel of any of the claims 1-4 characterized by the front face corresponding to the second conductive layer of the above having two or more irregularity among the aforementioned insulating layers, or a publication.
[Claim 6] The manufacture method of the liquid crystal display panel any of claims 2-5 which are characterized by providing the following, or a publication. The process which forms the first conductive layer of the above in order. The process which forms the aforementioned insulating layer on the conductive layer of the above first at least. The process which forms the second conductive layer of the above on the aforementioned insulating layer. The process which removes a part of second conductive layer of the above formed on the conductive layer of the above first.
[Claim 7] The manufacture method of the liquid crystal display panel any of claims 3-5 which are characterized by providing the following, or a publication. The process which forms the first conductive layer of the above. The process which forms the third conductive layer of the above in the portion which is equivalent to the connection field of the first conductive layer of the above and the second conductive layer on the conductive layer of the above first at least. The process which forms the aforementioned insulating layer. The process which removes the aforementioned insulating layer of the portion which is equivalent to the connection field of the first conductive layer of the above, and the second conductive layer at least, the process which forms the second conductive layer of the above, and the process which removes a part of second conductive layer of the above formed on the conductive layer of the above first.
[Claim 8] The manufacture method of the liquid crystal display panel according to claim 7 characterized by performing simultaneously the process which removes the aforementioned insulating layer, and the process which removes the insulating layer which exists in the part on the conductive layer of the above first.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to a penetrated type, a reflected type or the liquid crystal display panel that can be used as the used [together] type, and its manufacture method.
[0002]
[Description of the Prior Art] The liquid crystal display panel is widely used for the camcorder/movie equipped with OA equipment, such as a word processor and a personal computer, pocket information machines and equipment, such as an electronic notebook, or the liquid crystal display monitor taking advantage of the feature of being a low power, with the thin shape.
[0003] Moreover, since the liquid crystal display panel carried in the above-mentioned liquid crystal display panel does not emit light itself unlike CRT (Braun tube) or EL (electroluminescence) display, the lighting system which consists of a fluorescence pipe called back light is installed in the tooth back or side, and the so-called penetrated type liquid crystal display panel which controls the amount of transparency of back light light by the liquid crystal display panel, and performs image display is used well.
[0004] However, by the penetrated type liquid crystal display panel, in order that a back light may usually occupy 50% or more of the total power consumption of a liquid crystal display panel, power consumption will increase by preparing a back light.
[0005] Moreover, it was difficult as for a penetrated type liquid crystal display panel, for display light to look darkly to an ambient light [a reflected type liquid crystal display panel / conversely], when an ambient light is very bright, and to recognize a display.
[0006] Therefore, with the above-mentioned penetrated type liquid crystal display panel, separately, with pocket information machines and equipment with many machines used outdoors and always carrying, on the other hand, a reflecting plate is installed in a substrate instead of a back light, and the reflected type liquid crystal display panel which displays by reflecting an ambient light on a reflecting plate front face is used.
[0007] However, the reflected type liquid crystal display panel using the reflected light of an ambient light has the fault that visibility falls extremely, when an ambient light is dark.
[0008] In order to display for the purpose of a low power using an ambient light, when darker than the threshold value which has an ambient light also under the environment which can supply sufficient power supply, it becomes impossible moreover, to recognize a display by such reflected type liquid crystal display panel. This was the greatest fault of a reflected type liquid crystal display panel.
[0009] Moreover, since dispersion will arise also in the use efficiency of an ambient light if the reflection property of a reflector varies in the manufacture, the ambient-light intensity it becomes impossible to recognize a display will also vary between panels. Therefore, the liquid crystal display panel which has the display property stabilized if dispersion in a reflection property was not controlled beyond dispersion in the numerical aperture in the conventional penetrated type liquid crystal display panel on the occasion of manufacture was not able to be obtained.
[0010] In order to cancel the trouble of the above reflected type liquid crystal display panels and a penetrated type liquid crystal display panel, while making a part of back light light penetrate as shown in JP,7-333598,A, by the former, the composition which realizes both a penetrated type display and a reflected type display by one liquid crystal liquid crystal display panel is indicated by using a transflective reflective film which is made to reflect a part of ambient light.
[0011] The liquid crystal display panel which used the above-mentioned transflective reflective film for drawing 16 is shown. The liquid crystal display panel consists of a polarizing plate 30, the phase contrast board 31, the transparent substrate 32, the black mask 33, a counterelectrode 34, the orientation film 35, the liquid crystal layer 36, MIM37, a

pixel electrode 38, the light source 39, and a reflective film 40.
[0012] or the pixel electrode 38 which is a transflective reflective film makes metal particles deposit on the whole surface in a pixel very thinly -- or a hole minute in a field -- while it is formed so that it may be dotted with a defect, a reentrant defect, etc., and making the pixel electrode 38 penetrate the light from the light source 39, a penetrated type display function and a reflected type display function are simultaneously realizable by reflecting outdoor daylight, such as the natural light and indoor lighting light, by the pixel electrode 38
[0013]
[Problem(s) to be Solved by the Invention] However, the following faults arise in the display shown in drawing 16 . First, when the thing on which metal particles were made to deposit very thinly as an above-mentioned transflective reflective film was used, since it was necessary to use material with a big absorption coefficient, internal absorption of an incident light was large, and the absorption light and the scattered light which are not used for a display arose, and it had the problem that the use efficiency of light was bad (for example, 55% of light is not used for a display from a certain model).
[0014] on the other hand, a hole minute in a field as a pixel electrode 38 -- when a defect, a reentrant defect, etc. used the film with which it is dotted (opening is called hereafter), it had the problem that membranous structure is too complicated, membraneous control is difficult in order that a precise design condition may follow in manufacture, and it was difficult to manufacture the film of a uniform property In other words, the repeatability of an electrical property or an optical property was bad, and it was very difficult to control display grace as a liquid crystal display panel.
[0015] this invention is made in order to solve the above-mentioned trouble, the liquid crystal display panel which performs a penetrated type display and a reflected type display simultaneously by one substrate raises the use efficiency of an ambient light and lighting light (back light light) rather than the conventional liquid crystal display panel, and it aims at offering the liquid crystal display panel which simplified manufacture, and its manufacture method while stabilizing quality.
[0016]
[Means for Solving the Problem] The liquid crystal display panel of this invention consists of two or more pixels surrounded by two or more source wiring arranged so that it may intersect perpendicularly with two or more gate wiring and this gate wiring on a substrate. In the liquid crystal display panel by which the switching element formed near the intersection of the aforementioned gate wiring and the aforementioned source wiring and the pixel electrode connected to this switching element are formed in this pixel, and a penetrated type display and a reflected type display are performed simultaneously The aforementioned pixel electrode is characterized by having the first high conductive layer of the light-transmission efficiency connected electrically mutually, and the second high conductive layer of light reflex efficiency in the same pixel field, and the above-mentioned technical problem is solved by that.
[0017] It is desirable that the first conductive layer of the above and the second conductive layer are mutually prepared in another layer through an insulating layer.
[0018] It is still more desirable that the first conductive layer of the above and the second conductive layer are connected through the third conductive layer.
[0019] Moreover, the first conductive layer of the above, the second conductive layer, or the third conductive layer consists of the same material as a part of material which constitutes the aforementioned gate wiring or source wiring desirably.
[0020] The front face corresponding to the second conductive layer of the above has two or more irregularity among the aforementioned insulating layers still more desirably.
[0021] The process in which the manufacture method of the liquid crystal display panel of this invention forms the first conductive layer of the above in order, It is characterized by including at least the process which forms the aforementioned insulating layer on the conductive layer of the above first, the process which forms the second conductive layer of the above on the aforementioned insulating layer, and the process which removes a part of second conductive layer of the above formed on the conductive layer of the above first, and the above-mentioned technical problem is solved by that.
[0022] Moreover, it sets to the manufacture method of other aforementioned liquid crystal display panels. The process which forms the first conductive layer of the above, and the process which forms the third conductive layer of the above in the portion which is equivalent to the connection field of the first conductive layer of the above and the second conductive layer on the conductive layer of the above first at least, The process which forms the aforementioned insulating layer, and the process which removes the aforementioned insulating layer of the portion which is equivalent to the connection field of the first conductive layer of the above, and the second conductive layer at least, The feature of the feature is carried out for including the process which forms the second conductive layer of the above, and the process which removes a part of second conductive layer of the above formed on the conductive layer

of the above first, and the above-mentioned technical problem is solved by that.
[0023] Furthermore, it is desirable to perform simultaneously the process which removes the aforementioned insulating layer, and the process which removes the insulating layer which exists in the part on the conductive layer of the above first.
[0024] Hereafter, the operation by the above-mentioned composition is explained.
[0025] According to the claim 1 of this invention, since the pixel electrode has the first high conductive layer of the light-transmission efficiency connected electrically mutually, and the second high conductive layer of light reflex efficiency in the same pixel field, it can use an ambient light and lighting light without a loss as compared with the liquid crystal display panel using the conventional one-way mirror, and can raise the use efficiency of **** markedly. Since the material currently used for reflected type liquid crystal display panels with common all, such as aluminum, W, Cr(s), and those alloys, or a penetrated type liquid crystal display panel can be used as ITO which is for example, a transparent conductivity film as the first conductive layer, SnO2 grade, and the second conductive layer, manufacture is easy, and the liquid crystal display panel a display property and whose reliability were very stable can be realized.
[0026] Moreover, while both the technical problem which the conventional penetrated type liquid crystal display panel had that visibility falls by surface reflection under the environment where an ambient light is bright, and the technical problem which the conventional reflected type liquid crystal display panel had that it becomes difficult under dark environment to display observe an ambient light by panel brightness fall were simultaneously cancelable, it became the outstanding thing which has any feature. That is, in order for the liquid crystal display panel of this invention to use back light light like the conventional penetrated type liquid crystal display panel, irrespective of the intensity of an ambient light, the display recognition of it does not need to be attained and a reflected type liquid crystal display panel does not need to control it by the bottom of the environment which can supply sufficient power supply more precisely [dispersion in the use efficiency of the ambient light by dispersion in an above-mentioned reflection property]. Since the high field of the light reflex efficiency which has the high field and the second high conductive layer of the light-transmission efficiency which has the first conductive layer which exists in the same pixel contributes to a display complementary in use, no matter an ambient light may be what luminosity, a picture is displayed vividly.
[0027] Furthermore, when the liquid crystal display panel of this invention was adopted as a view finder (monitoring screen) of the digital camera of a battery drive method, or a video camera, no matter the ambient light might be what luminosity, it was able to maintain at the luminosity which is always easy to observe by adjusting the brightness of a back light.
[0028] Under fine weather, when it is used outdoors, even if it makes the brightness of a back light high, it grows dim and is especially hard coming to see it in the conventional penetrated type liquid crystal liquid crystal display. By erasing a back light, making the brightness of a back light low, and using together a penetrated type display and a reflected type display as a reflected type display, when such, the quality of image on observation can improve and power consumption can be lessened. On the other hand, it can consider as a legible display by switching a reflected type display and a penetrated type display by the direction of a photographic subject, when it is used in the interior of a room which bright sunlight inserts, or using them together. What is necessary is just to use it like the case where it is used on the outdoors under fine weather, when a day inserts in a monitoring screen. Moreover, what is necessary is just to use together with a penetrated type display using a back light, in photoing a photographic subject from the gloomy corner of the room.
[0029] Furthermore, when the liquid crystal display panel of this invention is adopted as a monitoring screen for mount of car navigation etc., no matter an ambient light may be what luminosity, it becomes possible to perform the display which is always easy to observe. The back light of brightness higher than the back light by which the monitor for mount which used the conventional penetrated type liquid crystal display is used for a personal computer etc. is used. The reason is because when the light from the bottom of fine weather or the outside shines into a screen. However, there is a bird clapper that it still grows dim and is hard to see. On the other hand, night and when running in a tunnel suddenly, with the brightness of the same back light as the outside of daytime or a tunnel, the fault that it was too bright and was hard to see had arisen. Since it is possible to always use a reflected type display together according to the liquid crystal display panel of this invention when such, even if it does not set up the brightness of a back light highly, under bright environment, a good display is realizable. Moreover, even if it is under pitch-black environment, a legible display is realizable only by switching on the light by some brightness (about 50 to 100 cd/m2).
[0030] According to invention of a claim 2, the first conductive layer and second conductive layer which constitute a pixel electrode are mutually prepared in another layer through the insulating layer. According to the above-mentioned claim 1, the thickness of a liquid crystal layer is controllable by the field of the first conductive layer and the second conductive layer by changing the thickness of an insulating layer. By this, adjustment of the optical property in both fields can be taken. The bilayer which, on the other hand, has mutually different electrode potential also in a

manufacturing process exists through an insulating layer, respectively. Therefore, since an electric corrosion reaction is not produced by making the developer at the time of patterning of a pixel electrode, the exfoliation liquid at the time of resist exfoliation, etc. into the electrolytic solution, a reliable liquid crystal display panel can be obtained.

[0031] For example, it is the bilayer (for example, it ITO(s) in a lower layer) of a pixel electrode, without inserting an insulating layer like this invention. Since the electrode potential of aluminum layer and an ITO layer is very large and many defective parts (minute opening) exist in a thin film when continuing and forming aluminum in the upper layer An electric corrosion reaction is produced by making the developer at the time of patterning of a pixel electrode, the exfoliation liquid at the time of resist exfoliation, etc. into the electrolytic solution, elution of an ITO layer advances, and it is easy to cause a pixel defect, an open circuit of wiring, and contamination of a liquid crystal layer. On the other hand, permeation of the liquid with which this insulating layer serves as a protective coat, and causes an electric corrosion reaction etc. can be prevented by forming an insulating layer in between like this invention.

[0032] Since according to invention of a claim 3 it connects through the third conductive layer which makes the both property ease even if the bilayer which constitutes a pixel electrode has the relation which is easy to generate electric corrosion, it becomes possible to inhibit the fall of the poor contact by the electric corrosion reaction, or reliability more.

[0033] According to invention of a claim 4, for a start, since it is the same as that of a part of material of gate wiring or source wiring any of the second and the third conductive layer they are, it becomes possible to carry out simple [of the manufacture process].

[0034] Since the front face in which the second conductive layer is formed among insulating layers has two or more irregularity according to invention of a claim 5, it can be made to be scattered about to the exterior, it is obtaining a large angle of visibility, and it not only reflects an ambient light, but a paper white display is attained, without using a scattered plate separately.

[0035] It is not required, and in order that complicated manufacture conditions like the liquid crystal display panel using the conventional one-way mirror may just use manufacture conditions for the general electrode material and wiring material row which were used for the conventional penetrated type liquid crystal display panel or the reflected type liquid crystal display panel, they can be manufactured easily and the repeatability is also good according to the manufacture method of the liquid crystal display panel of the claims 6 and 7 of this invention. Moreover, even if the first conductive layer and second conductive layer have the relation which is easy to cause electric corrosion, by making an insulating layer and the third conductive layer intervene, both can touch directly or it can manufacture in the state where the electrolytic solution is not touched. Therefore, generating of an electric corrosion reaction is inhibited and the liquid crystal display panel which has high reliability can be offered efficiently.

[0036] Moreover, since the process which removes the insulating layer of the portion corresponding to the connection field of the first conductive layer and the second conductive layer, and the process which removes the insulating layer which exists in the part on the first conductive layer are performed simultaneously according to the claim 8, the liquid crystal display panel which has high reliability can be obtained, without increasing the number of processes.

[0037]

[Embodiments of the Invention] (Operation form 1) The liquid crystal display panel of the operation form 1 of this invention is explained to below based on a drawing. Drawing 1 is the part plan of the active-matrix substrate in the liquid crystal display panel of this operation form, and drawing 2 is the A-A cross section of drawing 1 .

[0038] In drawing 1 , on the transparent insulating substrate 1 (not shown) which consists of glass or plastics, it is arranged so that two or more gate wiring 3 and two or more source wiring 9a may intersect perpendicularly, and TFT7 is formed near the intersection of the aforementioned wiring. A reflector 11 and transparency electrode 8a are connected to drain electrode 9c of TFT7 as a pixel electrode. If the portion in which these pixel electrode was formed is observed from the substrate upper part, it will consist of two fields, the high field A of light-transmission efficiency, and the high field B of light reflex efficiency.

[0039] Moreover, although not illustrated, the orientation film which has a liquid crystal orientation function is prepared in the front face of the active-matrix substrate of drawing 1 .

[0040] The opposite substrate equipped with the transparent electrode and the orientation film is stuck to the above active-matrix substrates on the liquid crystal display panel concerning this operation form and the following operation forms, and it comes to enclose liquid crystal between substrates. In addition, it may be separately equipped with the light filter, a phase contrast board, a polarizing plate, etc. if needed.

[0041] With this operation form, Field A is a square located in a picture element center section, and the cross-section structure is equipped with transparency electrode 8a connected to drain electrode 9c of TFT7 as a pixel electrode while coming to carry out the laminating of the high material of light-transmission efficiency. On the other hand, as Field B surrounded the above-mentioned field A, it was formed, and it equips the upper surface with the reflector 11 which

consists of high aluminum or aluminum system alloy of light reflex efficiency connected to drain electrode 9c of TFT7 as a pixel electrode. Thereby, Field B can reflect an incident light in the exterior efficiently. Moreover, since the reflector 11 has the shape of still more gently-sloping toothing on the front face, it has the composition that an incident light can be scattered to the moderate range.

[0042] In addition, what mixed the optically active substance S-811 (Merck Co. make) in the guest host liquid crystal ZLI2327 (Merck Co. make) which mixed black coloring matter 0.5% as liquid crystal was used.

[0043] In drawing 2 , it comes to carry out the laminating of the gate insulator layer 4, the semiconductor layer 5, the semiconductor contact layers 6a and 6b, source electrode 9b, and the drain electrode 9c to the upper part of the gate electrode 2 to which the above TFT 7 branches from the gate wiring 3 (shown in drawing 1) at order.

[0044] Transparency electrode 8a is connected to drain electrode 9c of TFT7, and this transparency electrode 8a is making the role of a pixel electrode. The layer insulation film 10 and the reflector 11 are formed in the portion equivalent to the aforementioned field B at the upper part of transparency electrode 8a, it connects with lower transparency electrode 8a electrically through the contact hole 13 formed in the layer insulation film 10, and this reflector 11 is a pixel electrode for impressing voltage to liquid crystal like transparency electrode 8a. At this time, the direct file of transparency electrode 8a and the reflector 11 is not carried out, and they are electrically connected by pinching the conductive metal layer 12 in between.

[0045] In the process which manufactures this, since a transparency electrode 8a top can be covered with an insulating layer 10 at the time of the pattern formation of a reflector 11 (it explains below for details), ITO and aluminum produce an electric corrosion reaction and the fault of wiring being disconnected can be prevented effectively. Moreover, it leaves an insulating layer 10 somewhat thinly on transparency electrode 8a, and can prevent producing an electric corrosion reaction between the manufacture back ITO and aluminum by making transparency electrode 8a into wrap structure completely.

[0046] In addition, although Ti was used as the above-mentioned metal layer 12 with this operation gestalt, if it is not this limitation but conductive material other than aluminum system, even if it will use material, such as Cr, Mo, Ta, and W, it is possible to acquire the same effect. Or it is possible to inhibit the electric corrosion reaction between Above ITO and aluminum also by using the charge of aluminum system alloy which added the metallic material with electrode potential higher than aluminum, such as W, nickel, Pd, V, and Zr, to aluminum as the above-mentioned reflector 11 instead of forming the metal layer 12. for example, aluminum -- W -- about 5.0at% -- an above-mentioned electric corrosion reaction can be more effectively inhibited by adding

[0047] Hereafter, the manufacture method of the active-matrix substrate of this operation gestalt is explained based on drawing 3 . First, as shown in drawing 3 (a), on the insulating substrate 1, a conductive thin film is formed, patterning is carried out to a desired configuration using photolithography technology, and the gate electrode 2 and gate wiring (not shown) are formed. With this operation gestalt, Ta was used as an insulating substrate 1 as a material (gate material is called hereafter) of glass, the gate electrode 2, and the gate wiring 3. However, as an insulating substrate 1, you may use material, such as plastics, besides glass. Moreover, the other materials which have conductivity, such as aluminum, Cr, Mo, W, Cu, and Ti, also as a gate material are also available.

[0048] Next, as shown in drawing 3 (b), the gate insulator layer 4, the semiconductor layer 5, and the semiconductor contact layers 6a and 6b are formed. With this operation gestalt, continuation membrane formation of a-Si and the n+ type a-Si which doped P as semiconductor contact layers 6a and 6b was carried out by CVD as SiNx and a semiconductor layer 5 as a gate insulator layer 4. And patterning is carried out to a predetermined configuration using photolithography technology, and the semiconductor layer 5 and the semiconductor contact layers 6a and 6b are formed.

[0049] Next, an electric conduction film is formed, patterning is carried out to a predetermined configuration using photolithography technology, and source wiring 9a, source electrode 9b, and drain electrode 9c are formed. With this operation gestalt, Cr system material was used as an electric conduction film. However, the other materials which have conductivity, such as aluminum, Mo, Ta, W, Cu, and Ti, as this material are sufficient.

[0050] Next, as shown in drawing 3 (c), the electric conduction film which has light-transmission nature is formed, and transparency electrode 8a is formed using photolithography technology. With this operation gestalt, ITO was used as this transparency electrode 8a.

[0051] Next, a metal membrane is formed and the metal layer 12 is formed using photolithography technology. When this metal layer 12 connected the aforementioned transparency electrode 8a and the reflector 11 formed at a next process, with this operation gestalt, Ti was used for it as a material through both. However, as long as it is material other than aluminum system, other materials, such as Cr, Mo, Ta, and W, are sufficient.

[0052] Next, TFT7 is formed by **********ing and dividing a semiconductor contact layer into source side 6a and drain side 6b as a semiconductor contact layer by using source electrode 9b and drain electrode 9c as a mask.

[0053] At this time, the source and the drain electrode layers 9a, 9b, and 9c may be formed in the upper layer of transparency electrode 8a.
[0054] Next, as shown in drawing 3 (d), the layer insulation film 10 is formed and the portion which serves as a contact hole 13, a transparency field (field A), etc. behind using photolithography technology is deleted from the layer insulation film 10. Moreover, the gently-sloping concavo-convex section 15 is formed on the layer insulation film 10 of the portion which can come, simultaneously forms a field B 11, i.e., a reflector.
[0055] In addition, the permeability of Field A can be raised by removing the layer insulation film 10 of the portion corresponding to Field A. However, it is not necessary to remove completely like this operation gestalt, and may be made to remain to some extent, or it does not matter even if it does not remove at all. For example, voltage concerning liquid crystal can be mutually made equal in Field A and Field B by controlling the thickness to remove. That is, the orientation state of liquid crystal is made to abbreviation homogeneity within a pixel.
[0056] Moreover, when the insulating layer is formed also on the end-connection child of the wiring formed in the substrate edge, you may remove the insulating layer simultaneously with this process. That is, although the connection electrode for connecting with IC driver etc. is formed in a part for a part for a source wiring terminal area, and a gate wiring terminal area in many cases by ITO, when forming a direct aluminum electrode on this connection electrode, the same electric corrosion reaction as the pixel section may occur. Then, since the insulating layer on a connection electrode must finally be removed, if this removal is performed simultaneously with the process which removes the layer insulation film 10 on the field A of the pixel section, it increases the number of processes and is suitable, although a problem is solved by preparing an insulating layer between ITO and aluminum.
[0057] The configuration of the concavo-convex section 15 of this operation gestalt is carrying out the round shape, when it observes from the upper part (shown in drawing 1 and 3), and the cross section is a thing of a gently-sloping configuration which changes continuously. Thus, if the reflector 11 formed at the following process on the layer insulation film 10 which equipped the front face with the concavo-convex section 15 is formed, while an incident light will be efficiently reflected on reflector 11 front face, the reflected light can be scattered in the moderate direction. In addition, the configuration of the concavo-convex section 15 to form does not need to form the above-mentioned concavo-convex section 15, when there is no need of scattering the reflected light that what is necessary is just to determine suitably according to the display property considered as a request.
[0058] In addition, although the organic resin of a monolayer (about 2.5 micrometers) was used as a layer insulation film 10 with this operation gestalt, you may be the cascade screen which consists of two or more material which is not limited to this and is different. However, if the layer insulation film 10 which consists of an organic resin is formed comparatively thickly like this operation gestalt, even if it makes a part of reflector 11 superimpose also on the upper part of TFT7, a parasitic capacitance will not occur and display grace will serve as fitness and a liquid crystal display panel with a high numerical aperture. Moreover, if it is an organic resin layer thick in this way, it will be easy to perform formation of the above-mentioned concavo-convex section 15.
[0059] Or you may use the common inorganic film which makes SiNx the start as an insulating layer instead of this layer insulation film. However, the concavo-convex formation by etching tends to become difficult instead of the ability to acquire high insulation, even if comparatively thin generally. However, it is suitable when the concavo-convex section does not need to be formed with the display property of the liquid crystal display panel considered as a request.
[0060] Then, as shown in drawing 3 (e), aluminum is formed, patterning of the portion which is equivalent to Field B with photolithography technology is carried out, and a reflector 11 is formed. This reflector 11 is electrically connected with drain electrode 9c of transparency electrode 8a of the lower part, and TFT7 through a contact hole 13 and the metal layer 12. Although aluminum was used as a reflector 11 with this operation gestalt, you may be not this limitation but the charge of an alloy of aluminum system, or a conductive material with the high rate of the optical reflected light. An active-matrix substrate is completed according to the above process.
[0061] Moreover, although not illustrated, an orientation film is formed in the front face of the above active-matrix substrate, and the liquid crystal display panel of this operation gestalt completes the opposite substrate equipped with this substrate, the transparent electrode, and the orientation film by enclosing liquid crystal between lamination and a substrate. As long as it is required, it may be separately equipped with a light filter, a phase contrast board, etc.
[0062] In addition, what mixed the optically active substance S-811 (Merck Co. make) in the guest host liquid crystal ZLI2327 (Merck Co. make) which mixed the pigmentum nigrum 0.5% as liquid crystal was used.
[0063] Moreover, with this operation gestalt, the liquid crystal display panel which has a good display property was able to be obtained by setting the rate of surface ratio of Field A and Field B to 40:60. In addition, the rate of surface ratio is not limited to this value, and may be suitably changed according to the transparency efficiency of Fields A and B or reflective efficiency, and the purpose of use. Moreover, with this operation gestalt, although one field A was

established in the picture element center section, it may not be limited to this and may be divided into two or more places, and the configuration is not restricted to a square, either.
[0064] by the liquid crystal display panel of this operation gestalt explained above, and the liquid crystal display panel of the operation gestalt shown below, since the high field A of light-transmission efficiency was looked like [the pixel center section] other than this and the high field B of light reflex efficiency is established in it as a pixel electrode 6, it becomes possible to use an ambient light and lighting light without a loss as compared with the liquid crystal display panel using the conventional one-way mirror Moreover, the liquid crystal display panel became the outstanding thing which has any feature while the ambient light could cancel simultaneously both technical problems that display observation became difficult by panel brightness fall under the environment where an ambient light is dark, in the technical problem that visibility falls by surface reflection under bright environment, and the conventional reflected type liquid crystal display panel, in the conventional penetrated type liquid crystal display panel. That is, irrespective of the intensity of an ambient light, the display recognition of the liquid crystal display panel of this invention does not need to be attained, and a reflected type liquid crystal display panel does not need to control it more precisely [dispersion in the use efficiency of the ambient light by dispersion in an above-mentioned reflection property].
[0065] Moreover, like the liquid crystal display panel using the conventional one-way mirror, it is not required, and in order that complicated manufacture conditions may just use manufacture conditions for the general electrode material and wiring material row which were used for the conventional penetrated type liquid crystal display panel or the reflected type liquid crystal display panel, they can be manufactured comparatively easily and the repeatability is also good [conditions] about the manufacture method of the liquid crystal display panel of this operation gestalt. Moreover, by the liquid crystal display panel using the conventional one-way mirror, difficult control of a display property etc. can be performed comparatively easily.
[0066] (Operation gestalt 2) The liquid crystal display panel of the operation gestalt 2 of this invention is explained to below based on a drawing. Drawing 4 is the part plan of the active-matrix substrate in the liquid crystal display panel of this operation gestalt, and drawing 5 is the B-B cross section of drawing 4 .
[0067] The manufacture method in connection with the electrical installation structure and its composition of a reflector 11 and TFT7 as a pixel electrode in the liquid crystal display panel and its manufacture method of this operation gestalt is different from the above-mentioned operation gestalt 1.
[0068] In drawing 4 and 5, transparency electrode 8a is connected to the drain electrode of TFT7, and this transparency electrode 8a functions as a pixel electrode which impresses voltage to liquid crystal in Field A. The layer insulation film 10 and the reflector 11 are formed in the portion equivalent to the aforementioned field B at the upper part of transparency electrode 8a, the direct file of this reflector 11 is carried out to lower drain electrode 9c through the contact hole 13 formed in the layer insulation film 10, and it functions as a pixel electrode like the aforementioned transparency electrode 8a. Since it has composition to which the direct file of ITO which is the material of transparency electrode 8a, and the aluminum which is the material of a reflector 11 is not carried out like the above-mentioned operation gestalt 1 in this operation gestalt, in Field B, it becomes possible in the field A of another side for electric corrosion etc. not to fear the electrical installation of TFT and such material, and to perform it certainly, having the high transparency efficiency of a back light light according the high light reflex efficiency of the ambient light by aluminum to ITO.
[0069] In addition, although this operation gestalt has indicated the electric corrosion reaction of ITO and aluminum, this invention is not applied only to this combination, and if it is used to the combination of a material of a different kind which has mutually different electrode potential which an electric corrosion reaction tends to produce, it is effective.
[0070] The manufacture method of the active-matrix substrate of this operation gestalt is explained to below. It is the same as that of the above-mentioned operation gestalt 1 till the place which carries out patterning of the one island of the semiconductor layer 5 of TFT7, and the semiconductor contact layers 6a and 6b.
[0071] Next, an electric conduction film is formed, patterning is carried out to a desired configuration using photolithography technology, and source wiring 9a, source electrode 9b, drain electrode 9c, and 9d of metal layers for connection are formed. With this operation gestalt, Cr system material was used as an electric conduction film. However, the other materials which have conductivity, such as aluminum, Mo, Ta, W, Cu, and Ti, as this material are sufficient.
[0072] Then, the same transparency electrode 8a as the above-mentioned operation gestalt 1 is formed. At this time, it considered as the structure of putting transparency electrode 8a on the upper part of 9d of metal layers for connection in part. Even if it is not this structure, you may put the 9d of a part of above-mentioned metal layers for connection on a part of transparency electrode 8a. In addition, ITO was used as transparency electrode 8a also with this operation gestalt.

[0073] At this time, source wiring 9a, source electrode 9b, drain electrode 9c, and 9d of metal layers for connection may be formed in the upper layer of transparency electrode 8a.
[0074] Next, a reflector 11 is formed, after forming the layer insulation film 10 by the same method as the above-mentioned operation gestalt 1 and puncturing a contact hole 13 and the layer insulation film 10 of the portion of a transparency field (field A). aluminum was used as a material of a reflector 11 also with this operation gestalt.
[0075] As explained above, in this operation gestalt, the direct file of the ITO as transparency electrode 8a cannot be carried out as a reflector 11, and poor generating by the electric corrosion of aluminum and ITO in the contact section can be suppressed especially in reliability. Since this metal layer for connection can be formed with the material of the source electrode of TFT, it can simplify the manufacture.
[0076] (Operation gestalt 3) This operation gestalt explains the another manufacture method of the liquid crystal display panel of the above-mentioned operation gestalt 2 based on a drawing.
[0077] Drawing 6 (a) - (c) is a cross section for explaining the manufacture method of the liquid crystal display panel of this operation gestalt, and is equivalent to the B-B cross section of drawing 5 . In addition, although explanation was omitted, the process before forming a layer insulation film in this operation gestalt should be performed according to the method explained with the above-mentioned operation gestalt 2.
[0078] It explains in detail below. First, after forming the layer insulation film 10 by the same method as the above-mentioned operation gestalt 2, as shown in drawing 6 (a), the layer insulation film 10 of contact hole 13 field is deleted using photolithography technology. At this time, the concavo-convex section 15 for scattering an incident light is formed in layer insulation film 10 front face of the portion which forms a reflector 11 in the same process like the above-mentioned operation gestalt 1. In addition, unlike the above-mentioned operation gestalt, the layer insulation film 10 of the portion used as Field A is not deleted.
[0079] And aluminum for reflector 11 or aluminum system alloy film is formed in the upper layer. With this operation gestalt, the organic resin of a monolayer was used as a layer insulation film 10. However, the layer insulation film 10 may be a cascade screen which consists of different two or more material. Moreover, as long as it is unnecessary, you may not form surface irregularity.
[0080] Next, as shown in drawing 6 (b), patterning of the above aluminum is carried out with photolithography technology, and a reflector 11 is formed.
[0081] Then, as shown in drawing 6 (c), all or some of wrap layer insulation film 10 is removed for a transparency field (field A).
[0082] In the liquid crystal display panel of this operation gestalt which performs a penetrated type display and a reflected type display simultaneously by the above The structure where the direct file of aluminum as a reflector 11 and ITO as transparency electrode 8a is not performed is taken. When poor generating by the electric corrosion of aluminum and ITO in the contact section can be suppressed in reliability and ITO of transparency electrode 8a is not exposed in a manufacturing process at the time of the processing process of aluminum of reflector material The liquid crystal display panel which can suppress the electric corrosion reaction of aluminum and ITO under manufacture can be manufactured.
[0083] (Operation gestalt 4) The manufacture method of the liquid crystal display panel of the operation gestalt 4 of this invention is explained to below based on a drawing. The process at which the liquid crystal display panel of this operation gestalt punctures the formation sequence and the layer insulation film 10 of transparency electrode 8a as a pixel electrode and drain electrode 9c of TFT7 is different from the above-mentioned operation gestalten 2 and 3.
[0084] Drawing 7 (a) - (c) is a cross section for explaining the manufacture method of the liquid crystal display panel of this operation gestalt, and is equivalent to the B-B cross section of drawing 5 . In addition, although explanation was omitted, the process before forming a semiconductor contact layer in this operation gestalt should be performed according to the method explained with the above-mentioned operation gestalten 1 and 2.
[0085] It explains in detail below. As shown in drawing 7 (a), after forming a semiconductor contact layer, a light-transmission nature electric conduction film is formed, and transparency electrode 8a is formed by carrying out patterning using photolithography technology. With this operation gestalt, ITO was used as transparency electrode 8a.
[0086] Next, an electric conduction film is formed and patterning of source wiring 9a, source electrode 9b, drain electrode 9c, 9d of metal layers for connection, and the metal layer 9e for transparency fields is carried out using photolithography technology. Source wiring 9c and source wiring 9a are connected electrically. Moreover, drain electrode 9c, 9d of metal layers for connection, and metal layer 9e for transparency fields are connected electrically mutually. With this operation gestalt, Ta system material was used as the above-mentioned electric conduction film. However, the other materials which have conductivity, such as aluminum, Cr, Mo, W, Cu, and Ti, as this material are sufficient.
[0087] Next, TFT7 is formed by **********ing and dividing a semiconductor contact layer into source side 6a and

drain side 6b by using source electrode 9b and drain electrode 9c as a mask.
[0088] Then, the layer insulation film 10 is formed and the layer insulation film 10 of the portion corresponding to the transparency field A and the portion of a contact hole 13 is punctured using photolithography technology. At this time, the concavo-convex section 15 for scattering an incident light is formed in layer insulation film 10 front face of the portion which forms a reflector 11. And aluminum for reflector 11 or aluminum system alloy film is formed in the upper layer. In addition, with this operation gestalt, the organic resin of a monolayer was used as a layer insulation film 10. However, a layer insulation film may be a cascade screen of a different material. Or you may not form irregularity in a front face.
[0089] As shown in drawing 7 (b), patterning of the above aluminum is carried out with photolithography technology, and a reflector 11 is formed.
[0090] Then, as shown in drawing 7 (c), all or a part of metal layer 9e which has covered the transparency field (field A) top is removed. It does not matter whether it is because removal of metal layer 9e uses photolithography technology at this time or carries out etching removal, using a reflector 11 as a mask. Or you may carry out etching formation succeeding the time of etching formation of a reflector 11.
[0091] Above the liquid crystal display panel and its manufacture method of this operation gestalt In order not to perform the reflector of aluminum, and the direct file of transparency electrode 8a of ITO, Since poor generating by the electric corrosion of aluminum and ITO in the contact section can be suppressed about reliability and ITO of transparency electrode 8a is not exposed about a manufacturing process at the time of the processing process of aluminum of reflector material, It has the advantage that the electric corrosion reaction of aluminum and ITO under manufacture can be suppressed.
[0092] (Operation gestalt 5) The manufacture method of the liquid crystal display panel of the operation gestalt 5 of this invention is explained to below based on a drawing. The liquid crystal display panel and its manufacture method of this operation gestalt have the feature in transparency electrode 8a and the structure of TFT7, and the process that prepares an aperture in the layer insulation film 10, and are different from the above-mentioned operation gestalten 2 and 3 at this point.
[0093] Drawing 8 (a) - (c) is a cross section for explaining the manufacture method of the liquid crystal display panel of this operation form, and is equivalent to the B-B cross section of drawing 5 . In addition, although explanation was omitted, the process before forming a semiconductor contact layer in this operation form should be performed according to the method explained with the above-mentioned operation forms 1 and 2.
[0094] It explains in detail below. As shown in drawing 8 (a), after forming a semiconductor contact layer, a light-transmission nature electric conduction film and a metal membrane are formed in succession, and patterning of the metal membrane is carried out, using photolithography technology as source wiring 9a, source electrode 9b, drain electrode 9c, 9d of metal layers for reflector-transparency electrode connection, and metal layer 9for transparency fields e. Then, a lower layer light-transmission nature electric conduction film is processed into aforementioned source wiring 9a, source electrode 9b, drain electrode 9c, 9d of metal layers for reflector-transparency electrode connection, and the same pattern as metal layer 9e for transparency fields, and transparency electrode 8a, source electrode 8b, drain electrode 8c, etc. are formed.
[0095] That is, when a certain poor open circuit has arisen in a part of one layer by making a source electrode, source wiring, and a drain electrode into the two-layer structure, since a normal signal spreads the layer of another side, it can be displayed normally. Moreover, with this operation form, ITO was used as a light-transmission nature electric conduction film, and Ta system material was used as a metal membrane. After removing the mask used when processing a metal membrane even if it carries out etching processing continuously with a metal membrane about processing of a light-transmission nature electric conduction film at this time and, it does not matter even if it carries out etching processing of the light-transmission nature electric conduction film using the pattern of a metal membrane.
[0096] Next, TFT7 is formed by **********ing and dividing a semiconductor contact layer into source side 6a and drain side 6b by using the source electrodes 9b and 8b and the drain electrodes 9c and 8c as a mask.
[0097] Then, the layer insulation film 10 is formed and the portions of a transparency field (field A) and a contact hole 13 are punctured on the layer insulation film 10 using photolithography technology. At this time, the concavo-convex section 15 for scattering an incident light is formed in layer insulation film 10 front face of the portion which forms a reflector 11. And aluminum as a reflector 11 or aluminum system alloy film is formed in the upper layer.
[0098] The organic resin of a monolayer was used for this layer insulation film with this operation form. However, a layer insulation film may be a cascade screen of the material from which plurality differs. Moreover, you may not form irregularity in a front face.
[0099] Next, as shown in drawing 8 (b), patterning of Above aluminum or the aluminum system alloy film is carried out with photolithography technology, and a reflector 11 is formed.

[0100] Then, all or a part of metal layer 9e which has covered Field A top as shown in drawing 8 (c) is removed. At this time, photolithography technology may perform removal of metal layer 9e, or it may perform a reflector 11 by **********ing as a mask. Furthermore, you may carry out etching formation succeeding the time of etching formation of a reflector 11.
[0101] Above the liquid crystal display panel and its manufacture method of this operation form In order not to perform the reflector of aluminum, and the direct file of transparency electrode 8a of ITO, Since poor generating by the electric corrosion of aluminum and ITO in the contact section can be suppressed about reliability and ITO of transparency electrode 8a is not exposed about a manufacturing process at the time of the processing process of aluminum of reflector material, It has the advantage that the electric corrosion reaction of aluminum and ITO under manufacture can be suppressed. Furthermore, since a pixel electrode is formed in the same process as other wiring, a manufacturing process can be simplified.
[0102] In addition, in this operation form, although the pixel electrode was formed at the same process as source wiring, a source electrode, and a drain electrode, it is not limited to this and may form at the same process as gate wiring or a gate electrode, and as a pixel electrode, it is not a transparency electrode, and a reflector may be formed at the same process as other wiring.
[0103] (Operation form 6) The liquid crystal display panel and its manufacture method of the operation form 6 of this invention are explained to below based on a drawing. Moreover, in this operation form, the structure and its manufacture method of a terminal area are also explained about the liquid crystal display panel of the above-mentioned operation form 6.
[0104] The liquid crystal display panel and its manufacture method of this operation form are different from the above-mentioned operation forms 1-5 in that a transparent electrode is prepared in a gate electrode, and gate wiring and this layer.
[0105] Drawing 9 (a) - (c) is a cross section for explaining the structure of the pixel section of the active-matrix substrate used for the liquid crystal display panel of this operation form, and a liquid crystal panel terminal area. In addition, drawing 9 (a) is drawing showing the cross-section structure of the pixel section of the active-matrix substrate concerning this operation form, and is equivalent to the B-B cross section of drawing 4 . Moreover, drawing 9 (b) is equivalent to the C-C cross section of drawing 10 , is drawing showing gate side edge child structure, and is [drawing 9 (c) is drawing showing source side edge child structure, and] equivalent to the D-D cross section of drawing 10 . Moreover, drawing 10 is the outline plan of the liquid crystal panel of this invention here.
[0106] Below, the composition concerning the liquid crystal display panel of this operation form is explained in detail. In drawing 9 (a), the same TFT7 as the above-mentioned operation form is formed on the insulating substrate 1. Moreover, transparency electrode 8a is prepared in the gate electrode 2 of this TFT7, and gate wiring (not shown) and this layer. Furthermore, drain electrode 9c of TFT7 is connected with lower layer transparency electrode 8a through the contact hole 16 formed in another side and the gate insulator layer 4 while connecting with the upper reflector 11 through the contact hole 13 formed into the layer insulation film 10.
[0107] When considering as the composition which makes the transparency electrode and reflector which consist of a dissimilar metal mutually as a pixel electrode in the same pixel like this operation form by this composition For example, the problem which electric corrosion generates by the electrode potential between each metal can be protected from the processing process back of transparency electrode 8a by continuing covering with the gate insulator layer 4 at least the portion in which transparency electrode 8a was formed at least by the time the processing process of a reflector 11 was completed.
[0108] Moreover, since it has the composition that the insulator layer (the gate insulator layer 4 and layer insulation film 10) was prepared in the upper part of the terminal area formed simultaneously with the above-mentioned transparency electrode 8a similarly, also about the terminal area structure shown in drawing 9 (b) and (c) Since it is possible to cover a lower layer terminal area with an at least more precise gate insulator layer until the processing process of the reflector 11 formed after formation of a layer insulation film is completed, generating of the electric corrosion between the reflector which is a dissimilar metal, and a terminal area can be prevented.
[0109] It explains to below, referring to drawing 11 and 12 about the manufacture method of the active-matrix substrate of drawing 9 (a). In addition, drawing 11 and 12 are the cross sections for explaining the manufacture method of the active-matrix substrate of drawing 9 (a).
[0110] In drawing 11 (a), on the insulating substrate 1, the electric conduction film which has permeability is formed and transparency electrode 8a is formed with photolithography technology. With this operation form, ITO was used as glass-substrate and transparency electrode 8a as an insulating substrate 1.
[0111] Moreover, patterning of the gate electrode 2 and the gate wiring 3 is carried out with photolithography technology. With this operation form, Ta system material was used as a gate material. However, you may be the other

materials which have conductivity, such as aluminum, Cr, Mo, W, Cu, and Ti, as a gate material.
[0112] In addition, in the above process, the sequence of the formation process of transparency electrode 8a, and the gate electrode 2 and the formation process of the gate wiring 3 can also be replaced.
[0113] Next, in drawing 11 (b), continuation membrane formation of SiNx, an amorphous silicon, and the n+ type amorphous silicon that doped P is carried out by CVD, respectively as the gate insulator layer 4, the semiconductor layer 5, and semiconductor contact layers 6a and 6b, and patterning of the semiconductor layer 5 and the semiconductor contact layers 6a and 6b is carried out with photolithography technology.
[0114] Furthermore, the contact hole 15 for connecting electrically to the gate insulator layer 4 transparency electrode 8a and the drain electrode formed in behind is formed. In addition, you may remove simultaneously the gate insulator layer 4 on the gate side edge child 20 who shows drawing 9 (b) and (c), or the source side edge child 21 at this time.
[0115] Then, as shown in drawing 11 (c), an electric conduction film is formed and patterning of source wiring 9a, source electrode 9b, and the drain electrode 9c is carried out with photolithography technology. With this operation form, Cr system material was used as this electric conduction film. However, you may use the material which otherwise has conductivity, such as aluminum, Mo, Ta, W, Cu, and Ti.
[0116] Next, it divides into source side 6a and drain side 6b by **********ing the center section of the semiconductor contact layers 6a and 6b by using source electrode 9b and drain electrode 9c as a mask. TFT7 is completed according to the above process.
[0117] Then, as shown in drawing 11 (d), the layer insulation film 10 is formed and a contact hole 13 is punctured on the layer insulation film 10 using photolithography technology. However, about the layer insulation film 10 corresponding to a transparency field (field A), it does not remove at this process, but later, it removes, after forming a reflector.
[0118] Next, as shown in drawing 11 (e), the concavo-convex section 15 is formed in the front face of the layer insulation film 10 corresponding to Field B by the photolithography like a last process.
[0119] In addition, although the organic compound insulator was used as a layer insulation film 10 with this operation form, you may be the cascade screen of not only this but a different material. Moreover, you may not necessarily form irregularity in the front face of the layer insulation film 10.
[0120] Next, as shown in drawing 12 (a), the high electric conduction film of reflective efficiency is formed as a material of a reflector 11.
[0121] As furthermore shown in drawing 12 (b), patterning of the reflector 11 is carried out with photolithography technology. The reflector 11 of the portion which serves as Field A at least in a pixel shall remove.
[0122] Finally, as shown in drawing 12 (c), the layer insulation film 10 on transparency electrode 8a equivalent to Field A is removed. Furthermore, the portion equivalent to Field A is removed also about the gate insulator layer 4.
[0123] In addition, if the gate insulator layer 4 or the layer insulation film 10 is made to remain, in order to be anxious about a voltage drop arising and voltage fully not being impressed to liquid crystal at this time, it is desirable to remove any insulator layer. Since a difference arises especially on the voltage impressed to the liquid crystal corresponding to Fields A and B when impressing voltage to liquid crystal by transparency electrode 8a and the reflector 11 which were mutually connected electrically like this invention, it is not suitable.
[0124] An active-matrix substrate is completed by the above method. Furthermore, after applying an orientation film to this active-matrix substrate, if required, orientation processing will be performed, and the liquid crystal display panel of this invention is completed by enclosing liquid crystal between an above-mentioned opposite substrate, and lamination and a substrate.
[0125] It explains referring to drawing 13 about the formation method of a terminal area formed in the substrate periphery section hereafter.
[0126] Drawing 13 is drawing for explaining the manufacture method of the gate side terminal area concerning the liquid crystal display panel of this operation form. In addition, about this terminal area, it is possible to form simultaneously with the formation process of the pixel section mentioned above.
[0127] In drawing 13 (a), a transparent electric conduction film is formed as a gate side edge child 20 on the insulating substrate 1. In addition, simultaneously with this process, a transparency electrode is formed in the pixel section. Then, a terminal 20 and the gate wiring 3 are electrically connected by forming the gate wiring 3 on a terminal 20 (it corresponds to the process of drawing 11 (a)).
[0128] Next, in drawing 13 (b), the gate insulator layer 4 is formed on the gate wiring 3 and the gate side terminal area 20. In addition, at this process, removal of the gate insulator layer 4 on a terminal 20 is not performed, but a next process performs it (it corresponds to the process of drawing 11 (b)).
[0129] Then, TFT is completed in the pixel section (it corresponds to the process of drawing 11 (c)).
[0130] In drawing 13 (c), the layer insulation film 10 is formed on the gate insulator layer 4 (it corresponds to the

process of drawing 11 (d)).
[0131] In drawing 13 (d), the electric conduction film which serves as a reflector 11 on the layer insulation film 10 is formed (it corresponds to the process of drawing 12 (a)).
[0132] In drawing 13 (e), the reflector 11 currently formed near the terminal area is removed. In addition, simultaneously with this process, the reflector 11 currently formed to Field A in the pixel is removed (it corresponds to the process of drawing 12 (b)).
[0133] In drawing 13 (f), the gate insulator layer 4 and the layer insulation film 10 on a terminal 20 are removed. In addition, simultaneously with this process, within a pixel, the gate insulator layer 4 and the layer insulation film 10 in Field A are removed (it corresponds to the process of drawing 12 (c)).
[0134] As mentioned above, also not only in a pixel field but a terminal area, since a terminal 20 and the gate wiring 3 are covered with an insulating layer (the gate insulator layer 4, layer insulation film 10) until the processing process of a reflector 11 is completed, it is possible to prevent that electric corrosion arises between the terminal 20 and the gate wiring 3 which are a dissimilar metal mutually, and a reflector 11.
[0135] In addition, although detailed explanation is omitted, it can form simultaneously with the formation process of the pixel section also about the source terminal area shown in drawing 9 (c), and it is possible to prevent generating of electric corrosion like the gate-terminal section.
[0136] Moreover, in the pixel section, when sequence of the process (process shown in drawing 11 (b)) which forms the process (process shown in drawing 11 (a)), the gate electrode 2, and the gate wiring 3 which form transparency electrode 8a is made reverse, it is possible to prevent generating of electric corrosion effectively.
[0137] The gate side edge child structure at this time is shown in drawing 14 (a), and source side edge child structure is shown in drawing 14 (b). In addition, also in which terminal area, the terminal has gate material which constitutes a gate electrode and gate wiring, and the two-layer structure which consists of a transparent electric conduction film which constitutes the transparency electrode 8. Also in this case, since it can continue covering a terminal with a gate insulator layer at least until the processing process of a reflector is completed, it is possible to prevent generating of electric corrosion effectively.
[0138] (Operation form 7) Even if it uses a method as shown in drawing 15 (a) - (c) as a process following drawing 11 (c) explained with the above-mentioned operation form 6, it is possible to prevent electric corrosion effectively. This operation form explains other manufacture methods of the active-matrix substrate concerning the above-mentioned operation form 6 to below.
[0139] In drawing 15 (a), the layer insulation film of the portion equivalent to Field A is removed at the same time it forms the layer insulation film 10 and punctures a contact hole 13 by the photolithography. Moreover, the concavo-convex section 15 is formed in layer insulation film 10 front face of the portion equivalent to Field B.
[0140] Next, as shown in drawing 15 (b), an electric conduction film is formed as a reflector 11 on the layer insulation film 10.
[0141] Finally, as shown in drawing 15 (c), the reflector 11 currently formed in the portion equivalent to Field A is removed.
[0142] Since lower transparency electrode 8a is covered with the gate insulator layer 4 until the processing process of a reflector 11 is completed also according to this process, generating of the electric corrosion which is easy to produce when a reflector 11 and transparency electrode 8a are formed by the dissimilar metal is stopped. However, as an insulating layer which covers transparency electrode 8a with this process, since it becomes a chisel further, drawing 11 and the process shown in 12 of the gate insulator layer 4 can prevent an electric corrosion reaction more effectively.
[0143] Moreover, since according to this process the layer insulation film which is simultaneously [with formation of a contact hole 13] equivalent to Field A is removed as shown in drawing 15 (a), as compared with drawing 11 and the process shown in 12, it is possible to reduce the number of processes.
[0144]
[Effect of the Invention] Since it has the high layer of light-transmission efficiency to which the pixel electrode of each other was connected electrically, and the high layer of light reflex efficiency in the same pixel field according to the liquid crystal display panel and its manufacture method of this invention as explained to the detail above, as compared with the liquid crystal display panel using the conventional one-way mirror, an ambient light and lighting light can be used without a loss, and the use efficiency of **** can be raised markedly. Since the material currently used for reflected type liquid crystal display panels with common all, such as aluminum, W, Cr(s), and those alloys, or a penetrated type liquid crystal display panel can be used as a high layer of ITO which is for example, a transparent conductivity film as a high layer of light-transmission efficiency, SnO2 grade, and light reflex efficiency, manufacture is easy and the liquid crystal display panel stabilized very much in respect of a display property and reliability can be realized.

[0145] Moreover, while both the technical problem which the conventional penetrated type liquid crystal display panel had that visibility falls by surface reflection under the environment where an ambient light is bright, and the technical problem that it becomes difficult under dark environment to display observe the ambient light which the conventional reflected type liquid crystal display panel had by panel brightness fall were simultaneously cancelable, it became the outstanding thing which has any feature.

[0146] That is, in order for the liquid crystal display panel of this invention to use back light light like the conventional penetrated type liquid crystal display panel, irrespective of the intensity of an ambient light, the display recognition of it does not need to be attained and a reflected type liquid crystal display panel does not need to control it by the bottom of the environment which can supply sufficient power supply more precisely [dispersion in the use efficiency of the ambient light by dispersion in an above-mentioned reflection property]. Since the high layer of light-transmission efficiency and the high layer of light reflex efficiency contribute to a display complementary in the same pixel in use, no matter an ambient light may be what luminosity, a picture is displayed vividly.

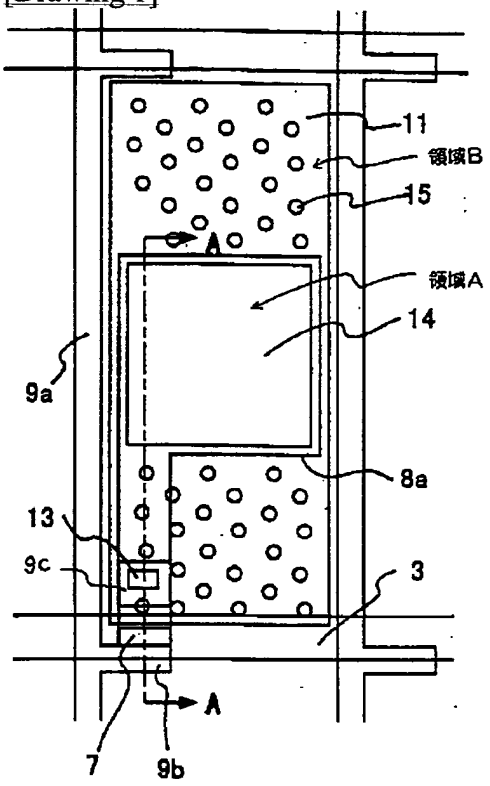
[Translation done.]

* NOTICES *

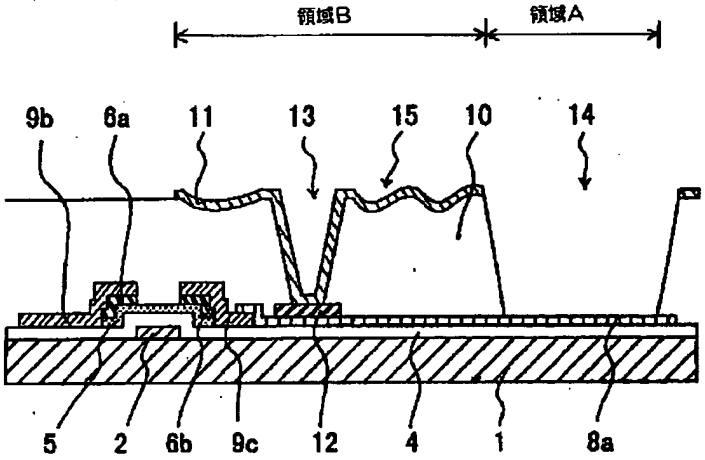
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

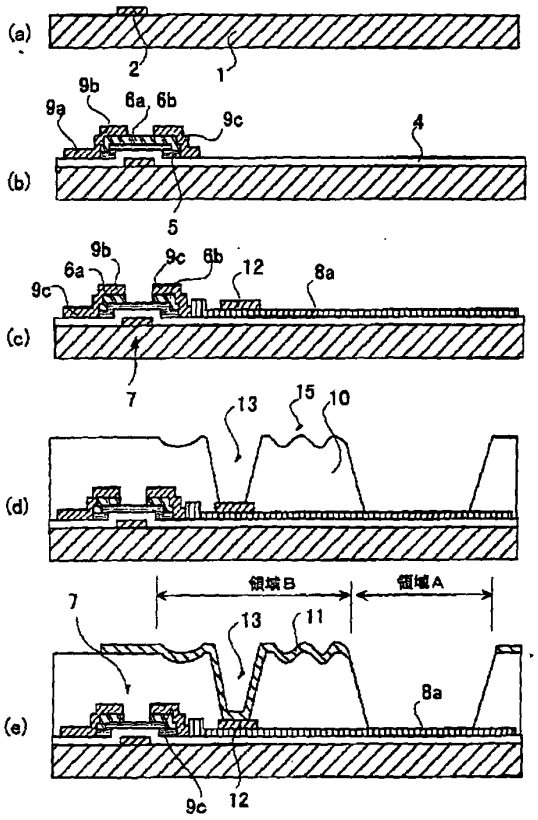
[Drawing 1]



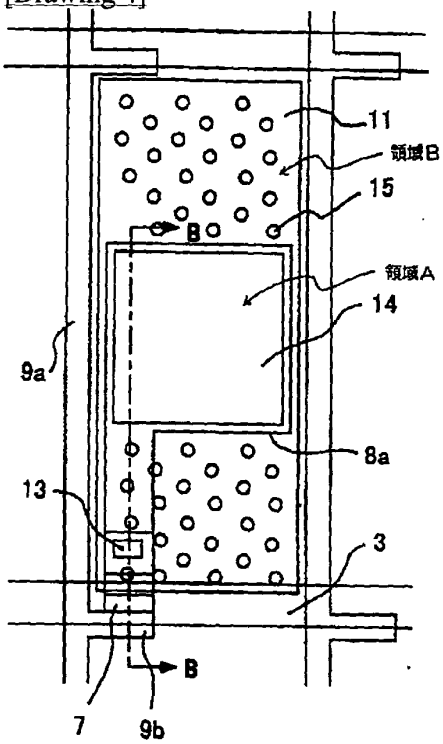
[Drawing 2]



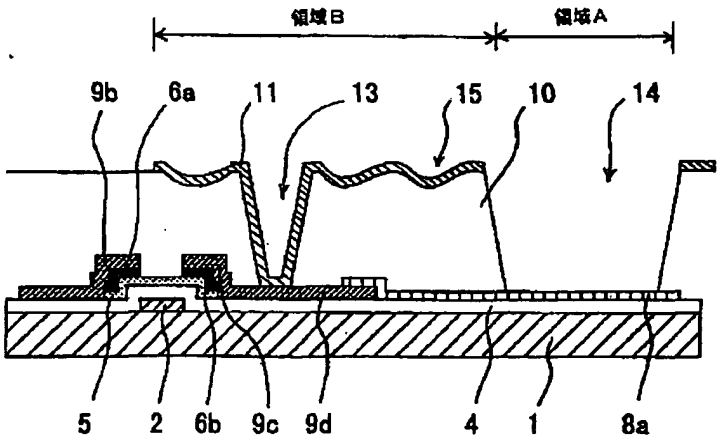
[Drawing 3]



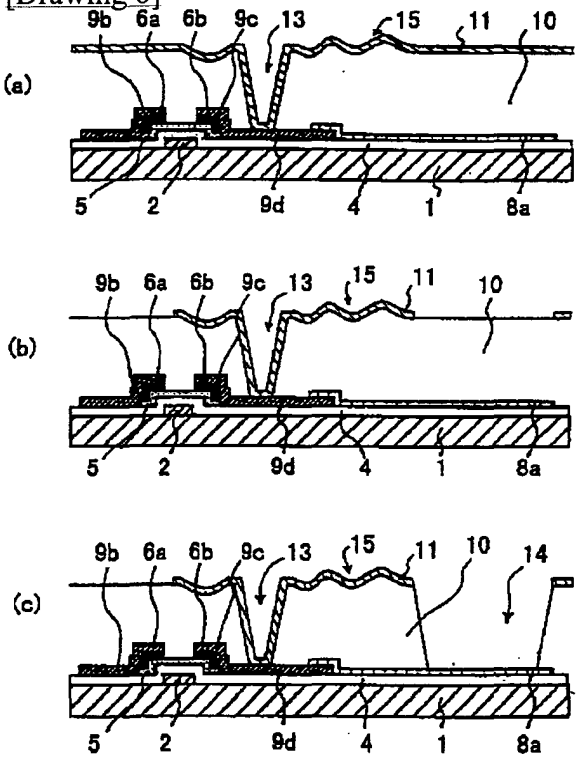
[Drawing 4]



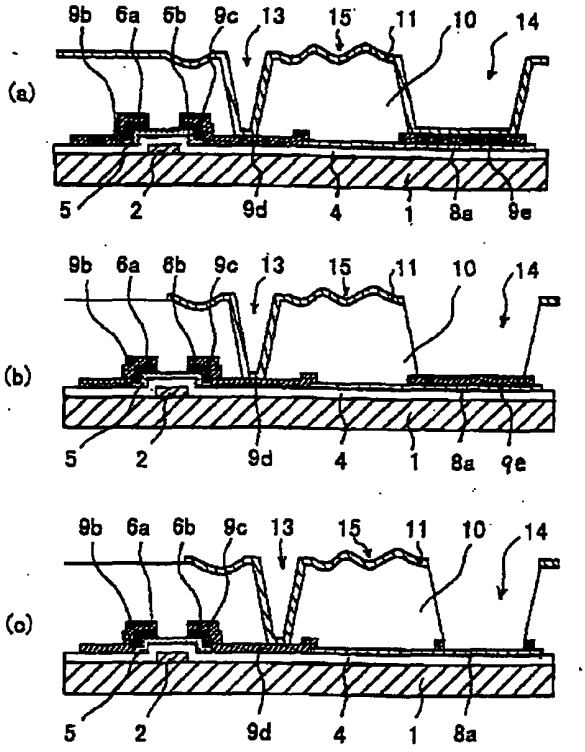
[Drawing 5]



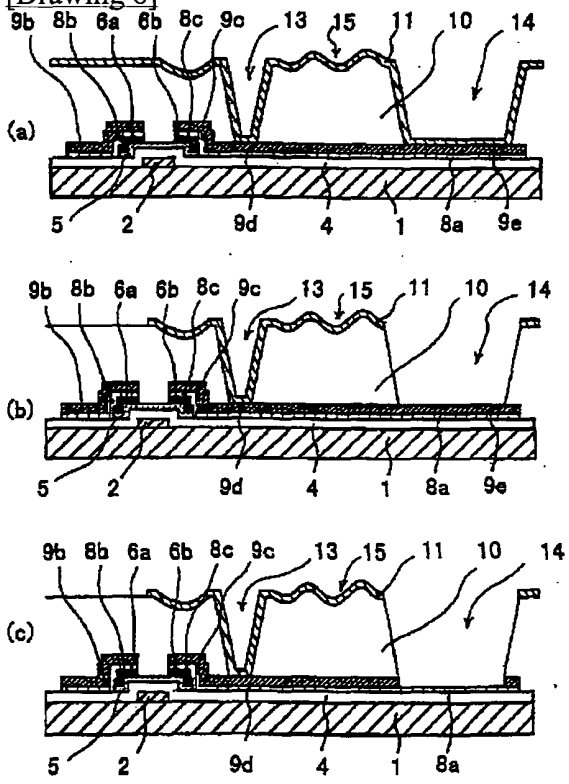
[Drawing 6]



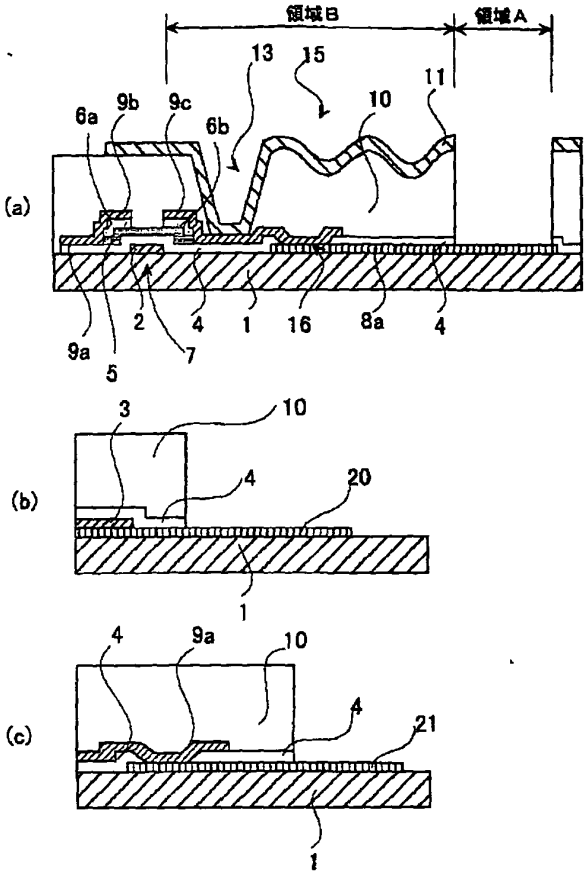
[Drawing 7]



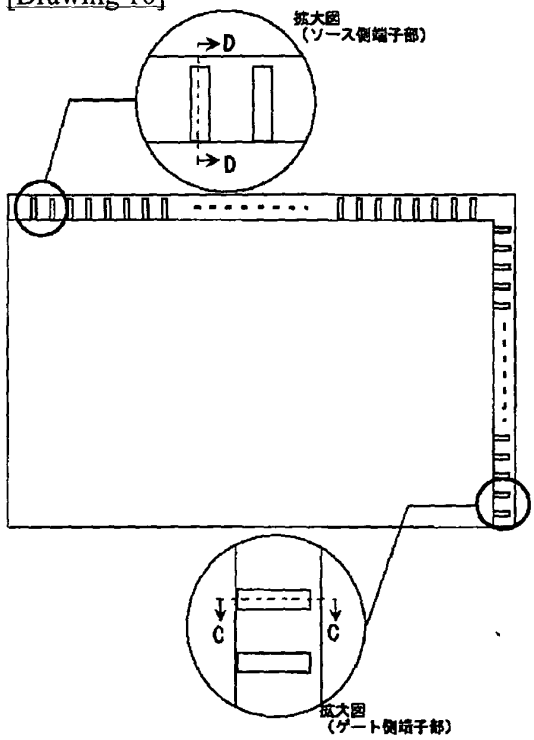
[Drawing 8]



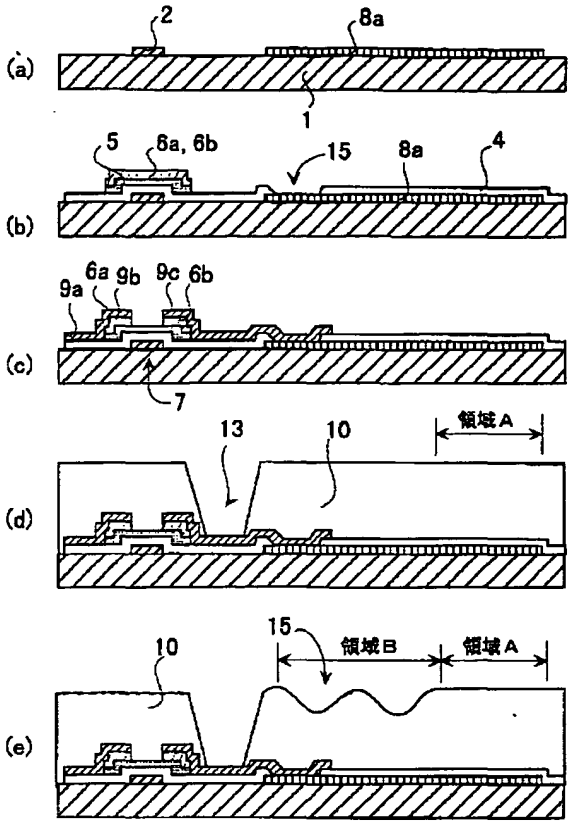
[Drawing 9]



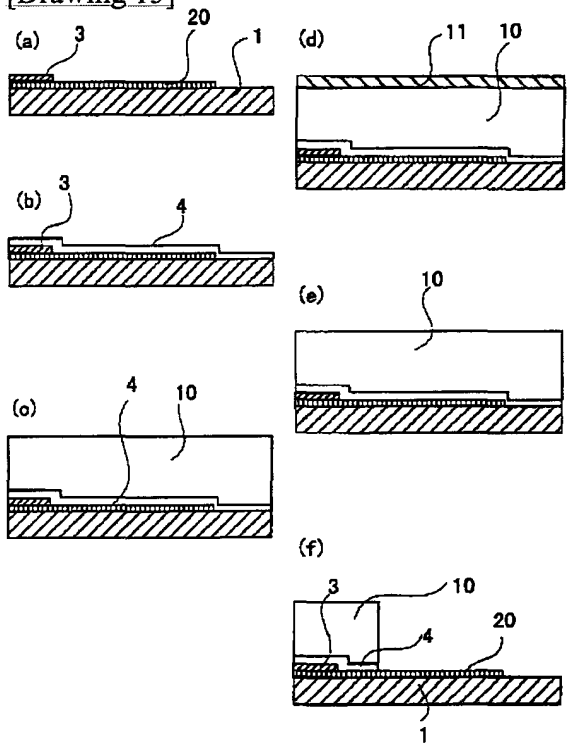
[Drawing 10]



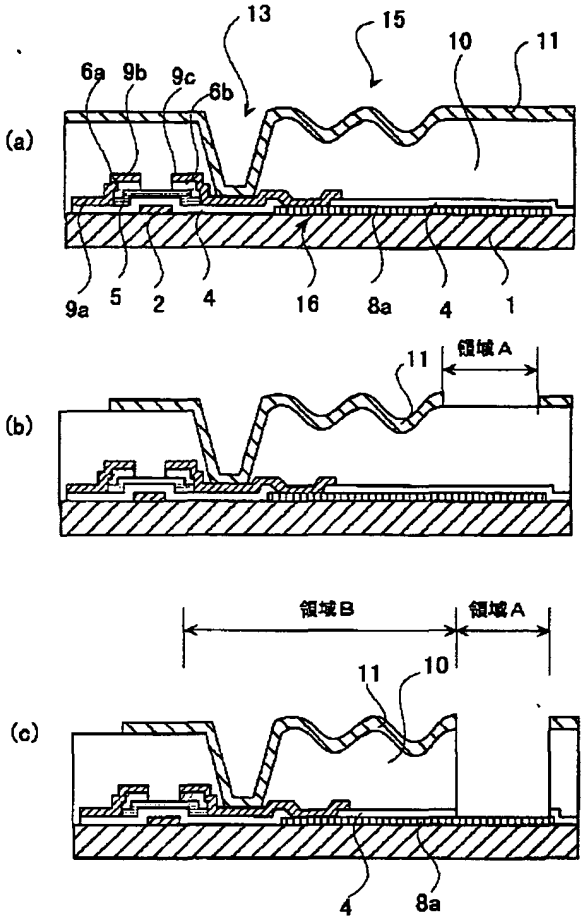
[Drawing 11]



[Drawing 13]



[Drawing 12]



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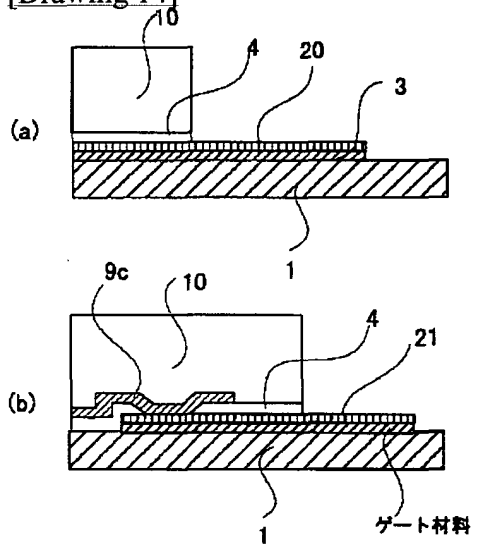
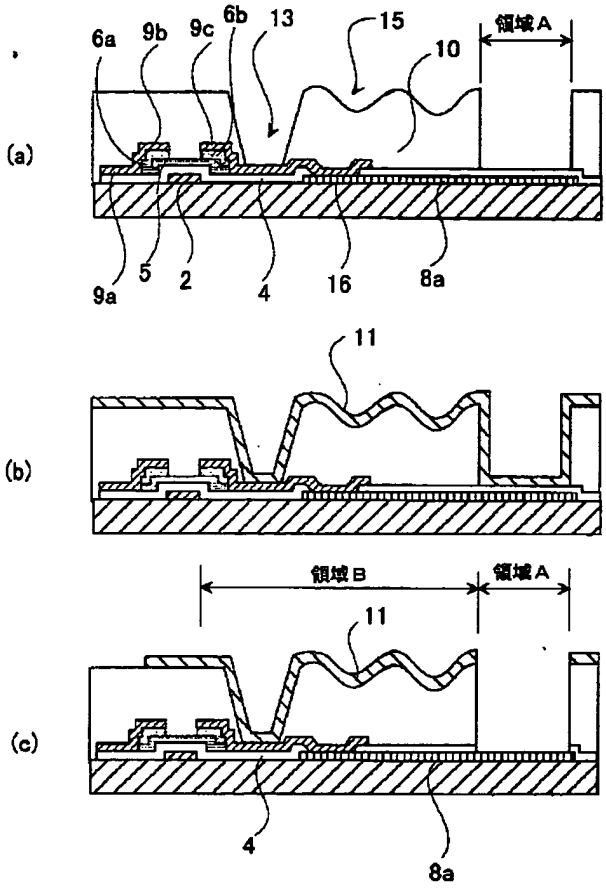
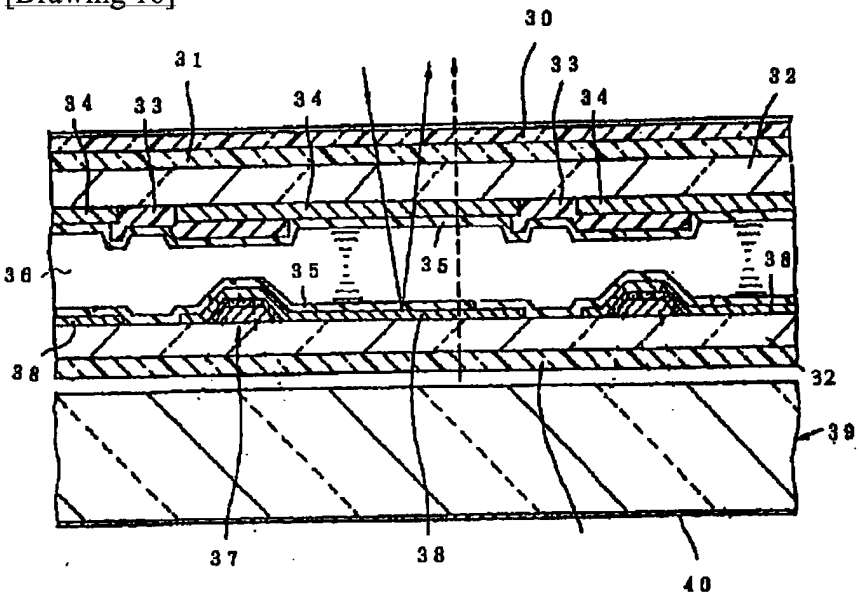


[Drawing 15]



[Drawing 16]



[Translation done.]